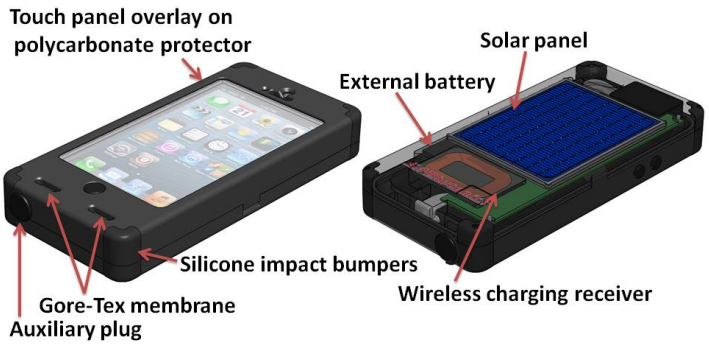
DHS Science and Technology Directorate

Hardening of Devices—Enabling Robust Communications for First Responders

Public safety agencies face unique challenges

There are many benefits to leveraging the smartphones that first responders already carry, but these devices are not durable under the extreme conditions often faced during response operations. Extreme heat or cold, and exposure to moisture, are common scenarios. Also, smartphones are subject to serious trauma from being dropped or struck during scuffles with suspects, running or climbing barriers, or any number of high-intensity activities. There are several ruggedized smartphone cases on the market, many of which are used by first responders, but none protect the most vulnerable component of the smartphone: its screen. Another major concern is that most first responders need to frequently wear gloves of some sort and most existing smartphone touchscreens do not respond to gloved fingers.



SA Photonics' Ruggedized Smartphone Enclosure

Ruggedizing Commercial Smartphones

Ruggedizing of Commercial Smart Phones–also known as the Hardening of Devices project–is a Small Business Innovation Research project to develop a ruggedized enclosure for smartphones for first responders. Sponsored by the Department of Homeland Security Science and Technology Directorate (S&T), and led by SA Photonics, an add-on ruggedized enclosure provides additional protection to commercial off-the-shelf smartphones as well as additional features useful to first responders, such as an extended battery life, solar and wireless charging, and temperature control in a system that allows use of the touchscreen while wearing gloves. The ruggedized enclosure provides impact protection for the smartphone (including the screen) to prevent damage as a result of dropping or blunt trauma. It also provides moisture and particulate protection, allowing the phone to be used in dirty and wet environments without harm.

How does it Work?

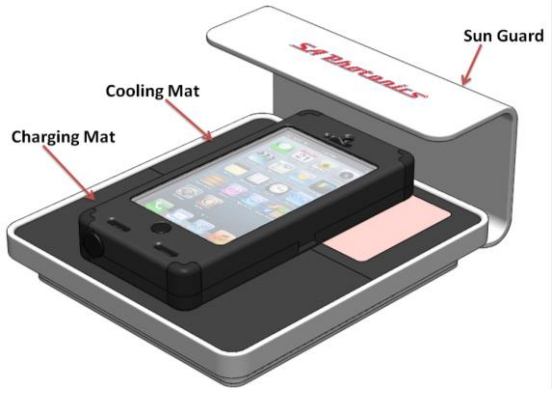
The ruggedized system uses an enclosure that provides impact protection to first responders' smartphones and a polycarbonate window to protect the screen. The enclosure incorporates a laminated touch panel that functions even with the use of gloves. Moisture and particulate protection are accomplished through an o-ring seal that maintains full functionality of the device through optical, acoustic, and mechanical feed-throughs.

To provide for operation in extreme cold, the ruggedized enclosure uses an integrated heater, which runs when the device is exposed to frigid conditions, keeping the battery at an optimal temperature. The enclosure also provides an efficient thermal path so heat can be removed using thermo-electric coolers integrated into a wireless charging station when ambient temperature inside the first responder's vehicle is too high.

Benefits

The smartphone ruggedized system protects smartphones, including their screens, when dropped from heights of up to nine feet, regardless of the hardness of the surface or manner in which the phone lands. This system will also provide the following benefits:

- External touch panel input which allows the use of gloves
- Wireless charging station that also controls phone temperature in hot environments
- Inductive and solar charging plus additional battery to provide ample backup power and easy charging
- Device-agnostic hardware interface through data port
- Battery heater for optimum operation in cold conditions
- Software integration with iOS (mobile operating system developed by Apple Inc.) or Android devices



SA Photonics' Smartphone Charging and Temperature Control Station

Next Steps

S&T funds the Hardening of Devices project through the Small Business Innovation Research program, an awards-based initiative that matches small businesses with federal agencies to develop innovative products. S&T completed the first phase of this project in July 2013 and is now developing a prototype along with a smartphone application, which will then be tested by first responders. S&T plans to deliver a final prototype by August 2015.